



BIOLOGICAL ACTIVITY OF DITERPENE ALKALOIDS OF THE GENUS *DELPHINIUM* (Literature review)

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ABOUT ARTICLE

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Abstract: Plants of the genus *Delphinium* have long been used in the Tibetan region due to their medicinal properties, and their analgesic, antibacterial, anxiolytic, antidepressant and anticancer activity is due to their main biologically active compounds, alkaloids, flavonoids and sterols. The review of this article summarized the compounds and pharmacological effects of the genus *Delphinium* and serves as a source of information necessary for further research.

DELPHINIUM TURKUMIGA MANSUB DITERPEN ALKALOIDLARINING BIOLOGIK FAOLLIGI (Adabiyotlar sharxi)

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MAQOLA HAQIDA

Kalit so'zlar: delphinium, alkaloid, diterpen, farmakologik faollik, aritmiya, antidepressant va tutqanoqqa qarshi faollik.

Annotatsiya: *Delphinium* turkumi o'simliklari Tibet mintaqasida qadimdan beri dorivor xossalaridan foydalanib kelinayotgan bo'lib, og'riq qoldiruvchi, antibakterial, anksiolitik, antidepressant va saratonga qarshi

faolliklari tarkibidagi asosiy biologik faol birikmalari alkaloidlar, flavonoidlar va sterollar hisobiga yuzaga keladi. Ushbu maqola sharhi *delphinium* turkumining birikmalari va farmakologik ta'sirini umumlashtirdi va keyingi tadqiqotlar uchun zarur ma'lumotlar manbai bo'lib xizmat qiladi.

БИОЛОГИЧЕСКАЯ АКТИВНОСТЬ ДИТЕРПЕНОВЫХ АЛКАЛОИДОВ РОДА *DELPHINIUM* (Обзор литературы)

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О СТАТЬЕ

Ключевые слова: *Delphinium*, алкалоид, дитерпен, фармакологическая активность, аритмия, антидепрессантная и противосудорожная активность.

Аннотация: Растения рода *Delphinium* давно используются в Тибетском регионе благодаря своим лечебным свойствам, а их обезболивающая, антибактериальная, анксиолитическая, антидепрессивная и противораковая активность обусловлена их основными биологически активными соединениями, алкалоидами, флавоноидами и стеринами. Обзор этой статьи обобщил соединения и фармакологические эффекты рода *Delphinium* и служит источником информации, необходимой для дальнейших исследований.

KIRISH

Ranunculaceae oilasiga mansub *Delphinium* turkumiga mansub o'simliklar asosan, Shimoliy mo'tadil zonalarda keng tarqalgan bo'lib, yer yuzida 350 ga yaqin turni o'z ichiga oladi [1]. Azaldan Xitoyda *Delphinium* turkumining 18 turi an'anaviy tibbiyotda ko'karishlar, revmatizm, tish og'rig'i va enterit kabi kasalliklarda davolash maqsadida ishlatiladi [2]. *Delphinium* turkumiga mansub o'simliklarning asosiy tarkibiy qismi diterpenoid alkaloidlar hisoblanib, ularning aksariyati fiziologik faollikka ega [3]. Farmakologik tadqiqotlar shuni ko'rsatdiki, diterpenoid alkaloidlar juda ko'p biologik faollikka ega bo'lib, aritmiyaga qarshi [4-6], nerv tizimiga ta'siri [7-10], antiepileptik [11], gipoglikemik [12], antigipertenziv, antidepressant, Alsgeymerga qarshi, antibakterial, diuretik, o'smaga qarshi [13] va yallig'lanishga qarshi va boshqa ta'sirlarga ega ekanligini ko'rsatadi.

ASOSIY QISM

Material va metodlar. *Delphinium* turkumiga mansub o'simliklaridan ajratib olinadigan alkaloidlarning biologik faolliklarini mahalliy va xorijiy adabiyotlar manbaalari asosida ma'lumotlar umumlashtirildi.

Olingan natijalar va ularning muhokamasi.

Antibakterial faollik. Hari va boshqalar [14] *D. brunonianum*ning alkaloidlar yig'indisi *Bacillus subtilis*, *Escherichia coli* va *Salmonella flexnari* kabilarga ingibirlovchi ta'sir ko'rsatadi. *D. uncinatum* yer ustki qismlarining metanolli ekstrakti gram-musbat bakterial shtammlarga (*Bacillus cereus* va *Staphylococcus aureus*) va gram-manfiy bakterial shtammlarga (*Escherichia coli* va *Klebsiella pnevmoniyasi*) qarshi yuqori samaradorlik bilan ta'kidlangan [23]. *D. brunonianum* Royle, Afg'oniston uchun mahalliy o'simlik, ilgari *S. aureus*, *E. coli*, *B. subtilis* va *P. aeruginosa* shtammlariga ta'sir qiluvchi antibakterial faollikka ega o'simlik sifatida xabar qilingan [24].

Analgetik faollik. Zahir va boshqalar girdob oqimidan foydalangan issiq plastinka usuli *D. denudatum*ning analgetik faolligini *Wistar* liniyalı oq kalamushlarda baholandi. Eksperimental natijalar shuni ko'rsatdiki, tajriba hayvonlarida *D. denudatum* etanol ekstrakti berilgan metanol fraktsiyasi propilennikidan samaraliroq, glikol guruhi va etanolning yuqori dozalarining (600 mg/kg) ta'siri ekstrakti va metanol fraktsiyasi (400 mg/kg) nazorat guruhiga teng faollikni namoyon qildi [15]. Nesterova va boshq. 0,1 mL to'liq Freundni naslli erkak kalamushlarga yuborish orqali qo'zg'atilgan surunkali immun yallig'lanish o'rganildi va natijalar shuni ko'rsatdiki, *Delphinium*ning 40% spirtli ekstrakti (0,12 mL/kg) va umumiy alkaloidlar (0,05 mg/kg) qo'shma shishish chastotasini naslli erkak kalamushlarda sezilarli darajada kamaytirishi mumkin. 14-kuni *delphinium*ning umumiy alkaloidlari (0,05 mg/kg) davolash guruhidagi kalamushlarda bo'g'imlari egilganda og'riqni bartaraf etdi va bu esa *Delphinium*ning yaxshi analgetik samarasini ko'rsatdi [16]. *D. grandiflorum* L. *leiocarpum*ning (0,5 g/kg) va spirtli ekstrakti (0,25 g/kg) issiq plastinka usuli va sirka kislotasi orqali antiexsudativ samarasini Suslov va boshq. Tomonidan izlanishlar olib borildi va solishtirma preparat asetaminofenga (0,2 g/kg), o'xshash faollikni va yaxshi og'riq qoldiruvchi samarani [17] yuzaga keltirdi.

Yallig'lanishga qarshi faollik. Nesterova va boshqalar *Delphinium* tarkibidagi alkaloidlar va flavonoidlar aralashmasi oq kalamushlarda peritonit modelining ekssudatsiya fazasida yallig'lanishga qarshi ta'sir ko'rsatdi. Flavonoidlarning suvli qismi (25,0 mg/kg) gistamin (0,1%), 5-gidroksitriptamin (0,5 mg/kg) yordamida chaqirilgan yallig'lanishning qaytalanishiga samarali terapevtik ta'sir ko'rsatdi [18]. Andreeva va Liu o'tkir yallig'lanish modelini yaratdilar sirka kislotasi ta'sirida kapillyar o'tkazuvchanlikning oshishi bilan erkak sichqonlarda o'tkazilgan tajriba natijalari shuni ko'rsatdiki, yuqori (1,5 g/kg), o'rtacha (1,0 g/kg) va past dozali guruhlar

(0,5 g/kg) *D. grandiflorum* dan etanol bilan olingan flavonoidlar yuqori yallig'lanishga qarshi faollikni namoyon qilganligini ko'rish mumkin [19].

Antidepressant faollik. Ebrahimzadeh va boshq. *D. elburzense* ekstrakti quyruq suspenziyasi (250 mg/kg, 500 mg/kg va 1000 mg/kg) oq sichqonlarda majburiy suzish tajribasi yordamida yuqori antidepressant faollikka ega ekanligi aniqlandi. Olingan natijalar bo'yicha 1000 mg/kg ekstrakt nazorat guruhidagi 15 mg/kg da imipramin [20] bilan bir xil ingibirlovchi faollikka ega ekanligini aniqladi.

Anksiolitik faollik. *D. denudatum* ekstrakti (200 va 400 mg/kg) Vistar albinos kalamushlarida his-hayajonga qarshi terapevtik ta'sir ko'rsatdi va *Amaranthus spinosus* ekstraktiga (100 mg/kg) bilan birgalikda yaxshiroq sinergizm samarani yuzaga keltirdi [21].

Saratonga qarshi faollik. *D. caeruleum*ning etil asetat ekstrakti *in vitro* 25; 50; 100 va 200 mg/mL jigar saratoni hujayralariga bergandan keyin, gepatomaga qarshi faolligini 12; 24 va 48 soatdan keyin jigar saratoniga qarshi yaxshi faollikka ega ekanligini aniqlandi [22].

Tutqanoqqa qarshi faollik. Antiaritmik faollikka ega bo'lgan allapinin va N-dezatsetilappakonitinning antikonvulsant faolligini baholash bo'yicha tadqiqot ishi keltirilgan. O'tkazilgan tadqiqotlar natijalari shuni ko'rsatdiki, allapinin va N-dezatsetilappakonitin antikonvulsant faolligida karbamazepindan kam emas va hatto biroz ustundir. Shu munosabat bilan, o'tkazilgan tadqiqotlar asosida, allapinin nafaqat kardiomiyositlarga, balki asab hujayralarida ion almashinuviga ham ta'sir qiladi degan xulosaga kelish mumkin. Diterpen alkaloidlari turli xil neyrofarmakologik faolliklarni ham yuzaga keltirishi tajribalarda isbotlangan. Jumladan asetilxolinesteraza ingibitori, neyroprotektiv, antidepressant va anksiolitik faolligi ma'lum Biroq, turli xil MNS ta'siriga qaramay, diterpen alkaloidlardan yangi dorilarni ishlab chiqishdagi so'nggi yutuqlar ularning neyrotoksikligi tufayli ahamiyatini yo'qotgan [26]. *Aconitum* va *Delphinium* turkumi o'simlik alkaloidlarining dastlabki farmakologik tadqiqotlari neyrotoksinlar kuchlanish eshikli Na(+) kanalining 2-joyida harakat qilishini va uning funksiyasini allosterik ravishda modulyatsiya qilishni taklif qilishdi. Ushbu birikmalar uchun kuchlanish bilan bog'langan Na(+) kanalida bog'lanish faolligini namoyish etish uchun tarkibiy talablarni tushunish turli sohalarda muhim ahamiyatga ega. Ushbu maqolada natriy ion kanalining blokatorlari va ochuvchilarini o'z ichiga olgan ikkita o'simlik turidan jami 65 ta tabiiy alkaloidga asoslangan kvant-kimyoviy tadqiqotlar va miqdoriy tuzilish-faollik munosabatlari (QSARs) haqida xabar berilgan [27].

XULOSA

Shunday qilib, *Delphinium* turkumiga mansub o'simliklardan ajratib olinadigan alkaloidlarning turli xil biologik faolliklarini namoyon qilganligi ushbu sinfga kiruvchi

o'simliklarni o'rganishga bo'lgan qiziqishni ortishiga sabab bo'ladi. Ushbu tahliliy maqolada ma'lum darajada diterpen alkaloidlari to'g'risida o'ziga xosliklar bayon etildi.

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